

## CLAIMS

1. A method of controlling the stress caused when forming a multilayer structure comprising:
  - 5       providing a first material;  
          configuring at least a portion of said first material to exhibit a first stress profile;  
          forming a second material over and in contact with said first material, a second stress profile being defined therebetween such that a net stress profile results between said first and second materials that is a function of said first and second stress profiles,  
10       wherein said first stress profile is configured in a specific manner so as to achieve a desired net stress profile.
- 15       2. The method according to claim 1, wherein said first stress profile is configured in a specific manner to achieve a predetermined net stress that is approximately zero.
3. The method according to claim 1, wherein said first stress profile is configured so as to be generally equal in magnitude, but opposite of the second stress profile such that said net stress profile is substantially zero.
- 20       4. The method according to claim 1, wherein said first and second materials are dissimilar.
5. The method according to claim 1, wherein said first stress profile is configured using an instrument.
- 25       6. The method according to claim 5, wherein said instrument is selected from the group consisting of a laser, an atomic force microscope tip, a sharp tip and an electron beam.
7. The method according to claim 5, wherein said instrument causes said first stress  
30       profile using a high energy density that ablates material locally.

8. The method according to claim 5, wherein said instrument induces said stresses using local melting and re-solidification.
9. The method according to claim 5, wherein said instrument uses shock waves to induce said first stress.
10. The method according to claim 5, wherein said instrument comprises a laser and said first stress profile is controlled by adjusting at least one of power, wavelength, and pulse frequency of said instrument.
11. The method according to claim 5, where said instrument configures said first stress profile by creating at least one of voids, grooves and trenches on said surface of said first material.
12. The method according to claim 1, wherein said first material comprises at least one of a polymer and a ceramic.
13. The method according to claim 1, wherein said first material comprises a metal.
14. The method according to claim 1, wherein said first stress profile is configured to exhibit a depth that is controlled to cancel mismatched stresses over a predetermined thickness.
15. The method according to claim 1, wherein said first stress comprises controlled stress patterns having predetermined shapes arranged to achieve said desired net stress profile.

16. A method of controlling the stress caused when forming a multilayer structure comprising:

providing a first material defining a substrate;

5 using an instrument to provide a first region of stress in said first material having first stress characteristics; and

depositing a layer of a second material over said first material such that said first region has a net stress having net stress characteristics different from said first stress characteristics.

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17. The method according to claim 16, wherein said instrument is selected from the group consisting of a laser, an atomic force microscope tip, a sharp tip and an electron beam.

15 18. The method according to claim 16, wherein said instrument comprises a laser and said first region of stress is configured by adjusting at least one of power, wavelength, and pulse frequency of said instrument.

19. The method according to claim 16, wherein said net stress characteristics comprises a  
20 magnitude of stress that is substantially zero.

20. The method according to claim 16, wherein:

a second stress having second stress characteristics is provided upon depositing said second material over said first material;

25 said net stress is a function of said first and second stresses; and

said first stress is selected such that said net stress is set to a predetermined stress having predetermined stress characteristics.

21. A method of controlling the stress caused when forming a multilayer structure comprising:

providing a substrate material;

5 using an instrument to configure a first stress profile in a region of stress on said substrate material, wherein said region of stress is defined by controlled stress patterns having predetermined shapes; and

10 depositing a second material over said substrate material, where a second stress profile is defined between said substrate and said second material; wherein a net stress profile results as a function of said first and second stresses, said net stress profile having predetermined net stress characteristics adjusted by said controlled stress patterns.

22. The method according to claim 21, wherein said first stress profile is defined by at least one of a compressive and a tensile stresses.

15 23. The method according to claim 21, wherein said net stress comprises at least one of compressive, tensile and sheer stresses.